From following patients to following up: a new system for learning and patient care in a longitudinal integrated clerkship

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GLOSSARY OF ABBREVIATIONS

Longitudinal integrated clerkship (LIC)
Cambridge Health Alliance (CHA)
Cambridge Integrated Clerkship (CIC)
Electronic medical record (EMR)
Protected health information (PHI)
Information technology (IT)

INTRODUCTION

Logbooks are a common method of tracking required clinical experiences in medical education. The term refers to a mix of tools and technologies aimed for turning student activity into data, and these systems have become a familiar part of undergraduate clinical education, often informing grading, program evaluation, and assessment of compliance with the Liaison Committee on Medical Education standards. Logbooks may be handwritten, scanned, or, increasingly, fully electronic, and vary in level of structure. They are primarily descriptive in nature, serving only to document exposure to clinical content or accomplished tasks.[1]

Longitudinal integrated clerkships (LICs) differ from the traditional block clerkships of the third year of medical school, and new logbooks technologies have developed to support this model. In an LIC, students learn through participating actively in the continuous care of a panel of patients over many months instead of over days or weeks.[2] Students follow their panel of patients across care venues and learn in multiple disciplines simultaneously,[3] while also playing a role in patient follow-up.[4] To facilitate this kind of contact with patients, LICs have created logbooks that interface with an electronic medical record (EMR) and can both alert students when a patient registers at a hospital or clinic as well as provide students with lists of their patients' upcoming appointments. [5] Such EMR-connected logbooks are designed to facilitate students attending scheduled clinical encounters and unscheduled admissions, all the while capturing structured, descriptive data about the numbers of patients students see and the clinical content of those interactions.

Beyond their traditional time on hospital wards and in outpatient clinics, LIC students engage in a broad range of patient-related tasks and activities that even LIC-specific logbooks neither document nor facilitate. These unique kinds of contact include, but are not limited to, home-visits, post-discharge check-ins, phone calls with patients to discuss the psychosocial aspects of care, or consultations with specialists that occur outside of formally scheduled appointments.[4] This kind of student work is highly valued by proponents of LICs and often invoked in arguments for how student involvement can improve patient care.[3]

As a student in the 2013-2014 class of the Cambridge Integrated Clerkship (CIC) – an LIC at Cambridge Health Alliance (CHA) for Harvard Medical School students – I became familiar with the functionality of an exemplary LIC logbook. Similar to many LICs, the CIC uses a fully electronic, EMR-connected logbook which sends alerts to students via email and pager. These alerts allow students to know when a member of their patient panel is registered at an emergency department registration or admitted to the hospital. Additionally, the logbook produces email digests of patients' upcoming appointments. The logbook is structured and primarily descriptive: each time a student sees a patient, they are expected to record the date of the encounter, select the venue, discipline, and diagnoses from predetermined lists. They are afforded a small free-text box to record a brief unstructured note about the contact. These entries, with their structured and unstructured components, accumulate in a database over the course of the year.

Descriptive logbooks have limitations. There is evidence demonstrating the limitations of logbooks as a process measure and showing a lack of association with clerkship performance.[6] Variation in logbook accuracy and incompleteness has not been sufficiently studied, and many unanswered questions remain about students' behavior and opinions about their use; students input has thus been called for in the development of new logbook systems.[1] The CIC's existing logbook has had extensive student variation historically, and similarly the reasons for this are not known. [4]

During my year as a CIC student, I began searching for a technology that could offer two features lacking in the existing logbook. First, I sought a way to conveniently consolidate formal and informal notes about patients for easy review. The size and accessibility of the free-text box was neither suited for storing lengthy clinical documentation nor recording quick, informal updates or reflections. To access a new free-text box required logging an entire encounter and entering all the required structured data about venue, discipline and diagnoses. Once entered, the unstructured documentation was only reviewable in a report of encounters that also included the accompanying structured data. Thus, the unstructured element of the existing logbook was difficult to access and difficult to review, limiting its utility in either my learning, in reflection, or in my contributions to patient care.

Second, I sought a way to plan future contact with patients and organize clinical tasks that fit the way LICs enable and expect students to follow patients. Particularly with patients experiencing extended outpatient work-up or managing a chronic disease, there may be weeks or months between patient contacts. As my panel of patients grew and my role in their care became more complex, the need for a system that would help me manage this growing number of overlapping schedules became more acute. I needed a way to file away my notes on a patient, but also schedule them for review at a future time that I determined based on the clinical situation. While entering a patient into the existing logbook did initiate alerts about the patient's admissions and appointments, it did not help plan the other tasks expected of LIC students that occur outside of traditional hospital stays and clinic visits. The existing logbook helped me follow patients, but did not help me follow up.

Technical and security features contributed to the choice of Microsoft Outlook's embedded Tasks application to provide these additional features. CHA deploys Microsoft Outlook ubiquitously on their workstations and synchronizes users' data via a secure Exchange server; given my responsibility of following patients across venues, I could not rely on a program accessible only via a single computer. While many cloud-based services now offer similar ease of accessibility and synchronization, none are approved or appropriate for storing patients' protected health information (PHI). Microsoft Outlook also is approved by CHA to house PHI, and thus the embedded Outlook-Tasks could store notes that included PHI without compromising patient privacy. Finally, the Tasks application allows for customization of the user interface depending on specific task-management needs and approaches. I designed both a note format and a customization of the To-Do List view that we used in this pilot between November 2013 and May 2014. We offer a full description of this format and customization in our Methods.

Adding consolidation features to a logbook results in a system similar to those that researchers in medical education refer to as portfolio. As with logbooks, the term portfolio

refers to a range of tools aimed at creating data from student experiences. This data may be used to support learning and assessment, though sufficient research has not accumulated to strongly link portfolio use to these outcomes.[7] Portfolios have not been specifically studied in the context of LICs. In traditional undergraduate medical education settings they have demonstrated some ability to support reflection practice, but students using them experienced complex negative effects including tension with teachers and concerns about their evaluation.[8] As with studies of logbooks, no portfolio has been developed to serve students' prospective planning or task management needs; this additional feature is entirely novel.

The primary goals of this study were to describe the pilot of a new system for consolidating students' longitudinal notes and organizing their clinical follow up within an LIC, to assess the system's feasibility, acceptability, and utility to students as they follow patients over a wide range of clinical encounters, and to explore the system's role in integrating and reflecting on any aspect of students' experience in an LIC. The pilot took place as an educational program improvement within an LIC at the Cambridge Health Alliance at Harvard Medical School. We accomplished our evaluation through qualitative analysis of focus groups, surveys, and collection of students' actual documentation as recorded within Microsoft Outlook's embedded Tasks application.

Beyond its primary goals, this study was designed to begin exploring questions about continuous patient relationships in medical education and the role logbooks may play in better understanding the value and nature of such longitudinal experiences. Continuity, in medical education and medicine generally is variously defined.[9],[10] Regardless of the definition, patients seem to appreciate it, physicians are satisfied by it, and resources end up more appropriately allocated because of it.[11] The unique role of students in an LIC represents one vision for creating continuity. Some medical educators, including many involved in LICs, have begun to embrace continuity in designing their curricula, invoking it as a way to improve mentoring, enhance content learning, and ultimately to develop meaningful relationships with patients.[4] Educators who design LICs highlight the model's ability to support continuity and meaningfulness in a way that has eluded more traditional structures. [12] However, the relationship between continuity and meaningfulness remains uncharacterized. This may be due to the persistent lack of specifics on exactly how patients are involved, [13] the lack of descriptions of the "fine-grain of what may constitute productive (and unproductive) encounters between medical students and patients."[14] Existing logbooks may not be able to provide the necessary detail. As with many logbooks, student use of the CIC's logbook has historically varied in accuracy and completeness, and the difficulty of inputting and reviewing unstructured documentation in the CIC's existing logbook may bias students away from documenting hard-to-code experiences. [1,4,15] These combine to limit the utility of existing logbooks to answer questions about the complex experience of students. Recognizing these limitations, past efforts to study LICs have relied on students' retrospective, reflective writing, to better understand students' learning experiences, but none have done so prospectively. [3],[16] This study included additional elements to consider the pilot system's ability to prospectively collect data about students' learning experiences in an LIC, with the results to guide future assessment of the pilot system in this regard.

METHODS

STUDY OVERSIGHT

This project was reviewed by the Harvard Longwood Medical Area IRB and was granted an exemption from full review. The study was conducted within the context of a pilot of this system as an educational program improvement. Students participated in the pilot as part of their clinical curriculum, but their participation in this study was additional, voluntary, and involved a formal consent process approved by the IRB.

PARTICIPANTS

The 2014-2015 class of the CIC consists of 12 students in their third year at Harvard Medical School. Students request to spend their third year in this innovative model; the total number of students from which the 12 are selected is not made public by the medical school. 12 of the 12 students in the 2014-2015 class were enrolled as participants, and there were no exclusion criteria.

STUDY OVERVIEW

Participants begin the CIC with a 6 week introduction to the hospital environment prior to beginning their 43 week longitudinal curriculum. We conducted an initial training session in which we described the note formatting, the basic use of Microsoft Outlook's embedded Tasks application, and encouraged participants to use this un-customized version of the system initially with any patient they intended to follow over time. After 4 weeks of use we provided a second training in which we instructed the participants in the customization of the To-Do screen. As the year progressed, the principal investigator was available to participants via email to answer technical questions about the system and to respond to any concerns about participation in the research project.

The following is a summary of the instructional content we provided participants over the course of the two training sessions; please see below for screenshots of the notes and the customized interface for planning and note review.

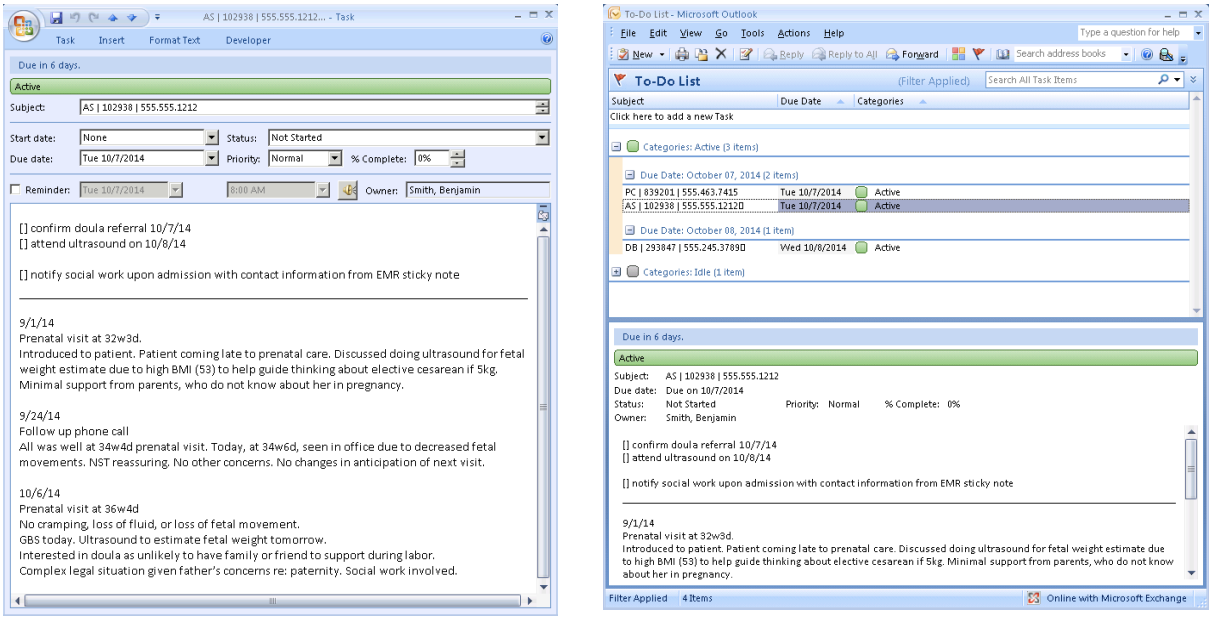
Note format

For each patient, participants created a unique Outlook-Task within Microsoft Outlook's embedded Tasks application and then followed a series of steps to format the Task for convenient use via the customized interface. One Outlook-Task corresponds to one patient, so a participant following 30 patients would have 30 Outlook-Tasks. Outlook-Tasks are individual files, similar to emails, that are based around a text box with rich formatting capabilities and have headers containing many sort fields, including Subject, Due Date, and Category. Participants were instructed to fill the subject field with the patient's name, MRN, and contact telephone number. They were then instructed to divide the text box of each Outlook-Task for each patient with a horizontal line. This separated the text box into two sections: above the line was for planning future activity, and below the line was for consolidation of notes. Notes were to be recorded in chronological order, with the first contact with a patient documented immediately below the horizontal line. Each documented contact would ideally include a record of the date and description of the

setting, such as phone call, office visit or waiting room. Finally, each Outlook-Tasks was assigned to the custom category called Active.

Customized To-Do view

The Tasks application is based around a column-based list called To-Do that displays all a user's Outlook-Tasks, and when customized as described here provided participants a way to easily see upcoming tasks for their patients at to schedule when they'd like to review a given patient's note in the future. The columns correspond to the fields in the header of each Outlook-Task. We intentionally reduced the number of columns in this view to the three noted from the Outlook-Task header above: Subject, Due Date, and Category. The view was further customized to group and sort the tasks first by category and then by due date in ascending order. Finally, the application's Preview Pane was activated at the bottom of the screen, which allowed the future tasks which the participant had consolidated above the line in an Outlook-Task's text box to be easily visible from within the To-Do list. With this customized view established, participants could see a list of all the patients they were following longitudinally, sorted by the Due Date they had chosen when recording notes about the patient or recording information about the upcoming task. This due date was also manageable from the To-Do List. Category organization provided participants with a way to hide Outlook-Tasks for patients they were not actively following by dragging the patient's Outlook-Task from the Active category to another customized category called Idle.



Note format (left) and customized interface (right)

After providing this guidance, we encouraged the participants to freely use the system and the Tasks application in creative ways that support their participation in patient care and the clerkship generally.

As an anticipatory step in studying continuity and meaningful experience, we asked participants to consider in real time if and when their experiences with the patients they follow have become meaningful. The authors intentionally left this term undefined for

participants in an attempt to let them broadly consider the elements of their interactions that might contribute to a patient experience becoming meaningful. In the documentation of that contact, the participants were asked to consider inserting the text "#meaningful" like a hashtag used in a social media post, followed by a short reflection capturing why they believe the experience had become meaningful.

DATA COLLECTION

Our data sources included two focus groups, the Outlook-Tasks participants created for their patients within Outlook, and a brief survey collected with the Outlook-Tasks.

The principal investigator personally conducted the focus groups at 4 and 24 weeks after the initial training session, with the first focus group occurring immediately after the final training session. The focus groups were recorded using a pin-protected mobile device maintained without wireless connectivity during recording and temporary storage. The audio file was transferred with a USB cable via the principal investigator's password-protected and encrypted personal computer to an HMS IT-provided IRON KEY USB drive. The audio file was deleted from the mobile device, and the IRON KEY became be the storage device for all identified study-related data (transcripts, qualitative analysis files, etc). The audio files were transcribed by the principal investigator, and the transcripts were de-identified by assigning participants a letter to enable portability. The identification key was stored on the IRON KEY until it was destroyed.

Initial analysis of the focus groups revealed that participants varied both in the number of patients for whom they had created Outlook-Tasks and the ways in which they documented their contact with patients. To inform our analysis of this variable use, we designed a survey for participants that we collected at the time of Outlook-Task submission. This survey asked students to select exemplary Outlook-Tasks that represented their usage of the system, to briefly characterize that usage, and to estimate the number of Outlook-Tasks that each exemplary Outlook-Task represented. The survey also included an open-ended question to collect general reflections from the one participant unable to attend the second focus group. These surveys were de-identified by randomly assigning participants a number unknown to the investigators and having participants submit their survey into a corresponding numbered folder on CHA's secure network to which they had write privileges but which were only readable by the investigators. Once submitted, this de-identified survey data was consolidated into one spreadsheet for portability. Again, the identification key was stored on the IRON KEY until it was destroyed.

Collecting participants' Outlook-Tasks required additional care to ensure the security of the protected health information (PHI) contained within them. To de-identify themselves as authors of the Outlook-Tasks, participants again copied their files into folders readable only by the investigators. The principal investigator manually ensured that all Tasks had their author-ship meta-data removed prior to providing the co-investigator (the participants' clerkship director) access. The content of participants' Outlook-Tasks then remained on CHA's network, accessible only to the investigators until they were stripped of all patient identifiers.

DATA ANALYSIS

The principal investigator coded both focus group transcripts with an iterative process of structural and data driven coding. [17] The co-investigator independently read and coded the transcripts, followed by a consensus conference to reconcile discrepancies. Coding of focus group transcripts and survey data was aided by NVivo 10. We analyzed the survey data in two ways. First, we read the participants' characterizations of their exemplary Outlook-Tasks to assess for any themes beyond those revealed by the focus groups. Second, we used these characterizations to guide our selective review of the exemplary Outlook-Tasks. Finally, we reviewed the exemplary Outlook-Tasks themselves for quotations and specific examples to demonstrate the themes revealed by our coding of the focus group transcripts, and to once again assess for saturation of the focus group themes.

Consensus coding resulted in three major themes with numerous sub-codes, and our Results section reflects and constructs a narrative that demonstrates this structure while incorporating quotations from the focus groups and survey. We present related excerpts from the Outlook-Tasks in table form.

RESULTS

Twelve students participated in the first focus group, 11 in the second focus group, and nine submitted semi-structured surveys accompanied by examples of their Outlook-Tasks. We divide our reporting of this data into three sections reflecting the main themes identified in our analysis: use, which describes what participants say they did with the system and demonstrated doing in their Outlook-Tasks; technical factors, which reports participants' description of how software, network, and the IT environment influenced their use; and value, motivation & impact, which describes their discussion of why they used it in the way they chose.

USE

Participants primarily described using the system for documentation and reflection, for task management, and for learning; we discuss these categories in greater detail below. Otherwise, students described the system enabling them to support transitions of patient care, and two students suggested the system supported organization of their patient panels.

For documentation and reflection

Participants used the Tasks application to document patient contact that occurred in a range of settings and organized their documentation in a range of formats. The range of settings included in-patient wards, outpatient clinics, and diagnostic testing and imaging appointments, and occurred both in the Cambridge Health Alliance and at other hospitals. They also documented informal contact that occurred outside of clinic visits, such as phone calls with patients. These encounters included references to clinical issues. Formats ranged from formal clinical notes with standard structure (such as History & Physical or Subjective, Objective, Assessment & Plan) to informal paragraphs or short lists. They also described using the system as a place for drafting: participants took notes there when they were interviewing patients in clinic, when pre-rounding on inpatient floors, or when trying to consolidate a clinical summary, which they then used to in preparation for presentations and for more formal documentation. Some participants' Outlook-Tasks contain copied

email correspondence between them and patients' providers; this correspondence included documentation of patient interactions or participants work coordinating follow up.

Scattered throughout their informal clinical documentation and their documentation of patient contact outside of formal visits, participants engaged in a variety of reflective writing about their patients' experience and their own. Their documentation of patients' experiences range from brief to lengthy, and include descriptions of patients' emotional responses, financial hardships, relationship concerns, and understanding of their disease process. In the first focus group, participants were curious about what others were documenting. After one participant described a powerful experience they had chosen to document, another asked "Were you writing a clinical note? Was it just creative?" The student responds: "Not creative. I was just writing 'Has three kids, likes to play soccer,' things I was worried I would forget when we were talking about them later. 'Scared of death. Is there a way for the family to be supported.' That was the level of note-taking."

Participants indirectly suggested another category of reflective writing that they put in Outlook-Tasks because they felt it did not belong in the EMR. They did not reference a formal definition of what was appropriate or inappropriate for each setting, but did offer examples that demonstrated this distinction. One participant felt this applied to "my reflections, like systems things observed alongside patient specific things" and something that "seemed more like a process outcome." One participant attributed this sense of inappropriateness to the reflective nature of their writing, because "it was a little bit about me and how the experience had struck me."

For task management

Participants used the system to manage a range of tasks, some directly connected to patients and their care and others completely unrelated. They name specific patient contact activities that they planned for or reminded themselves of via this system, including calling patients to inform them of results, calling patients to remind them of appointments, and attending appointments with patients. They used the system to highlight issues of clinical significance so they could bring them up again during future contacts. Less directly connected to patients, they planned for their own follow up on patients' results of imaging studies and labs. Some participants used the system to plan and track their own completion of clerkship responsibilities and logistics, including writing notes, completing certain numbers of clinics, and alerting their fellow students to deadlines.

For learning

Some participants used the Tasks application as a tool for learning as opposed to direct care. Some named Outlook-Tasks by clerkship, or created Outlook-Tasks for specific clinical topics or scenarios. They described using the task management features to plan when they would read or write about a topic, and then use the free-text of the Outlook-Task itself to consolidate their notes on that topic or even to draft assignments they would turn in to their preceptors. One participant gathered links to resources they had consulted on a patient at the bottom of that patient's Outlook-Task. Some participants also used it in organizing and doing writing for the clerkship's long-term projects.

Variation in Use

Participants varied in their primary use of the system. Several participants were surprised to hear from one participant that "every note I've ever written, I copy it into there." This participant was set apart as being "good at organizing," with the speaker being "on the opposite end of the spectrum." Indeed, some Outlook-Tasks exhaustively consolidate lab results and formal documentation by the participant and even include lengthy notes by a patient's providers, while others limit their consolidation to only their own notes or even only their informal documentation. Some participants describe themselves as being extensive users of the task management features and only minimally used the Tasks application for documentation. Some were strict about not using the system for anything unrelated to patients, and some adopted it as the organizing system for all of their work related to the clerkship. Even within participants who primarily managed tasks, they varied in their tolerance for overdue tasks and the volume or complexity of tasks they explicitly managed. One student attributed variation across participants to variable expectations from preceptors, with each student having been subject to a unique set of different teachers' approaches to documentation. Another participant suggested that this inter-student variation stemmed from lack of clarity about clerkship requirements, specifically what kind of writing would be necessary to submit at the end of the year. We discuss this in greater detail in the context of motivation.

Participants varied in their willingness to engage in informal documentation or reflective writing. Several attributed this to a non-reflective personality type, with one saying "I never kept a daily journal about my inner thoughts" and another agreeing "Me either! I'm not that person." Still others who considered themselves reflective seemed unwilling to do so. One participant explained that "The things I reflect upon aren't things that I'm writing for the clerkship director to read. They're things that I have personal reflections on and I don't necessarily do them in Outlook, because I associate that with administrative tasks." This may have stemmed from different opinions on the role of the system as it related to documentation of professional or personal writing. One found it to be such a personal format the participant felt uncomfortable opening Outlook in the presence of a patient. In contrast, other participants felt that the space was not personal enough to provide a space for effective reflection, stating they "only use it as a technical tool."

In addition to varying between each other, participants varied within their own use for different patients and from the first focus group to the next. Participants described developing implicit categories of patients that they documented, managed tasks for, (i.e. followed) in different ways. When asked to submit exemplary Outlook-Tasks to demonstrate their use of the system, participants outlined the differences in the way they followed patients. One student, in reference to a patient who stood out as someone whom he followed closely, described that he changed how he documented their interactions as the year progressed: "Every appointment I would write a little something…something special or memorable that happened in the appointment, or sometimes, a few times, said things that I felt. I only did it with her. But not since…the very beginning of the year." This may relate to changes in participants' valuation of the system and motivation to use it, which we discuss in greater detail below.

Participants' use of the system* and descriptions of exemplary Outlook-Tasks			
Participant Number	Total Outlook-Tasks in Outlook	**Patient initials and open-ended characterization of exemplary Outlook-Tasks**	Estimated # represented by exemplary Outlook-Task**
01	117	**BC -** I used this task to summarize my pregnant patient's course, in case I needed to quickly review. I only really used it for my first six or so patients, so 6.	6
		HG - I used this task to keep track of my Gi cancer patient. It is the only task which has free text in it to remind me of things I thought were important but had no place in the record. It is my only #meaningful! I have 1 of these tasks	1
		MS - I used this task to set as a reminder for a pt. I used your checklist in the top part, I did not use the bottom part to aggregate any information. I have around 20 tasks like this.	20
		MV - I used this task to keep track of a patient who I never ended up following. I have around 20 of these tasks	20
		Psa - I used this task as a stand-alone bringback document to print out and discuss with my preceptor. I have around 30 of these tasks	30
02	81	**IM -** used to keep track of contact-info; I have like 15 pts with this minimal level of info	15
		JR - I keep track of to-dos for this patient. I don't always copy in notes, but I do sometimes. I have 3 other patients that I follow this closely.	4
		Clinics - used to keep track of number of clinics	[*Not provided*]
		OB topics encountered - used to keep track of topics / discussions during clinic	[*Not provided*]
		SD - used to keep track of a specific note I wrote during clinic hours	[*Not provided*]
		WW - used to keep track of to-dos / phone convos	[*Not provided*]
03	49	**RR -** I use this task to organize notes and to-dos for the patients that I follow closely. I always put my notes for a patient into outlook. -I have 10 other patients that I follow this closely. I have many others whom I follow like this but on a short-term basis (ie call patients). I use this for method for all of my clerkships.	10*
04	27	**GD -** This tab was for an OB patient of mine whom I saw in prenatal visits, at her c-section, and in post-partum visits. I used the task to organize these different notes so I could refer to them quickly when she was on L&D and then in follow-up. I have one of these for each of my longitudinal OB patients (6 so far).	6
		JK - I have seen JK in both medicine clinic and at an endocrinology appointment. I used the task to keep track of the notes I wrote and to remind myself to check in with him about his ultrasound appointment. I have 13 tasks like this (there will be more when I catch up with my task-keeping), but this is one of the longer tasks in this category because I have seen JK more.	13

05	42	**TS -** I used to keep track of notes and to-dos in these for both those I followed closely as well as many others. There are 34 such tasks.	34
		Treatment of Vertigo Nausea and Vomiting - I use tasks like these for preparing bringbacks, rounds presentations, and tutorials. There are 8 such tasks.	8
07	60	I found hard to track tasks in Outlook as I cannot access in a clean way from home or from clinic computers (usually logged in as alliance). I started creating patient folders in EPIC where I can track new lab results using tab for "new results since." [*No other notes left by participant.*]	N/A
08	45	[*No notes left by participant.*]	N/A
09	174	**KB -** Patient information task - I keep a record of all the notes/interactions I've had with this patient, as well as things I must do for the patient (i.e. patient calls, patient appointments) 105 total	105
		Bringback task - I record all information I find to bring back to particular clerkships. The clerkship associated with this bringback is included in the title. 59 total	59
		Project task - I record all project ideas and assignments associated with clerkships or outside projects in this category of tasks. 5 total	5
10	149	**CV -** I use tasks like this to jot down notes from chart searches or from clinic when I don't write a note. There are 5 like this.	5
		EQ - I use this task for all the notes I write for him that I put in EPIC. He is someone I follow closely. I have 2 other patient like this.	3
		IP - I use tasks like this to write notes for patients that I see in clinic or on burst. Some of whom I see multiple times, others that I see only once. There are 130 like this.	130
		neuro template - I use this as a template to refer to since I use this to write all my notes and do not use smartphrases in EPIC. I have 4 others like this.	5
		PC - I use this task to make notes about appointments that I attend with patient, whom I follow closely. I don't write notes for him, so this is just for me. I have 3 other patient like this.	4
06		*Participant did not submit survey.*	
11		*Participant did not submit survey.*	
12		*Participant did not submit survey.*	

*All nine participants who submitted the survey reported continuing to use the system at least somewhat. No data is available about continued usage by the three participants who did not submit the survey.

**The number of Outlook-Tasks represented by each exemplary Outlook-Task is an estimate by each participant. We cannot determine whether the discrepancy between their estimates and their total number of Outlook-Tasks is a result of inaccurate estimation, of existing Outlook-Tasks they do not describe, or some other cause.

TECHNICAL FACTORS

Features and bugs of this system, plus elements of the participants' broader IT environment, shaped participants' use of the system and how they described their expectations. Participants mentioned numerous applications that they used regularly, and invoked the overlaps or gaps between them when discussing the features of this system.

Participants described a central role for features related to due dates and reminders. All participants that used due date-related features relied on the ability to assign Outlook-Tasks a due date, but they managed those Outlook-Tasks and their due dates differently. Some relied on the customized interface, pointing out that their Outlook-Tasks "show up in the order I need to do them." Others valued the visual cue of an assigned due date turning red when it had passed. One participant described discovering that Microsoft Outlook can display Outlook-Tasks according to due date within the embedded Calendar application, and others relied on pop-up reminders that occurred at future times they assigned. Participants spoke positively of this system in both focus groups, describing it as having "made my life so much better," and that setting a due date "is just the best thing that happens. It's the only way I get things done."

Visual elements of the interface affected the experience of some participants. Participants used a variety of simple text symbols to mark the tasks that accumulated above the line in their Outlook-Tasks. Participants maintained this organization across Outlook-Tasks for patients they followed differently. A participant relied on having a contact number for the patient prominently displayed in the subject of the Outlook-Task, which facilitated phone contact by removing the step of searching the medical record for the number. The customization of the To-Do list enabled participants who were "turned off by the initial clutter of buttons" to be "more likely to use it now." Some went on to discuss the interface as initially "stressful" and say they were "completely intimidated" at first, but the customizations permitted one to "actually feel like I can use it." Format and layout was so important that students were upset when they trialed a way to access the system from home and it led to unintended changes in font size and color. This bug was enough to eventually completely dissuade one participant from using the system.

The details of how and from where students accessed Outlook influenced their use of the system. Within the CHA network, participants could expect to be able to log-in to workstations with their personal username and gain access to the full Microsoft Outlook application. Participants noted the quickness and accessibility of the system enabling them to capture things they might not have had a place to write. One participant used the search feature to quickly find and review their documentation of previous encounters. However, some students needed to use workstations in ambulatory settings logged in with a generic account which required them to access the system as if they were off-site. Participants used the system at these ambulatory workstations and outside the CHA network more variably. The formatting bug described above was referenced as a reason some did not access Outlook remotely at all. Those who did access it used it when following a patient to another hospital system, when making patient calls from home, or when preparing in the evening for clinical encounters the next day.

Some participants mentioned specific alternatives technologies for specific work. At least two participants used Google Calendar to record activities in order to prove completion of clerkship requirements. One participant mentioned that Google Docs as a suite of services that would be incredibly useful if it were suitable for storing patient information. This met with approval from many in the first focus group, who mentioned data security as an important factor keeping them using this system instead of trying alternatives. A personal networked drive on CHA's secure system (called the G: drive, and available to all CHA users) enabled some participants to store Microsoft Word documents for preceptors who expected notes and other assignments in that format; some used this drive also to store learning resources.

In contrast to the participants who considered alternative technologies, one participant valued the system's integration with other applications participants are expected to use: "[This system] has revolutionized my organization life…it's integrated into a system I already use, the Mail. If it were a separate system, if it were not EPIC and not Outlook, I would use it zero…I'm forced to use it a little bit, that helps me a lot." Participants longed for more integration with their existing logbook, and noted the redundancy between writing about patient encounters in a Outlook-Task and logging the structured data about those interactions. They wholly attributed their continued use of the existing logbook to the pages and emails this provides them about their patients.

Participants used the hospital's EMR, EPIC Hyperspace, to frame some of their discussion and criticism, though their opinions about this comparison varied. Some noted the lack of EPIC's features for creating customizable boiler-plate text from keyboard shortcuts, and the ability to quickly import lab values. Some participants noted this, but then composed their notes in EPIC and consolidated those they wanted for the future in an Outlook-Task. In contrast, some students never wrote notes directly in EPIC, doing all their writing in an Outlook-Task and then copying in what they wanted documented in a patient's record. Some participants noted the accessibility, privacy, and flexibility of the writing space, which led them to preferentially take notes on interviews, gather data from pre-rounding, and draft clinical summaries about patients in Outlook-Tasks. Some participants disliked the inability of an Outlook-Task to provide them up-to-date clinical information on a patient, saying "the way I think about the medical situation of the patient is not translatable to Tasks." The same participants discussed doing a chart review for a patient in EPIC and valuing the ability to see their writing in the context of a patient's test results and the writing of providers. Some desired integration of the Tasks application's features into EPIC, while others used a messaging feature within EPIC Hyperspace to send themselves messages to be delivered at a future time as an alternative to setting due dates and to dos. While some participants got better at using this alternative, others noted that they struggled to find these messages and never used that feature. Variation in expectations from preceptors again influenced their use of different systems. Some preceptors relied on EPIC messaging, while some relied on email, and participants believed this to have steered them toward or away from documenting in Tasks.

Excerpts from participants' submitted Outlook-Tasks

[ ] DC summary
[ ] f/u w/ [*outside hospital*] team

"Above the line" tasks for patient TS

[X] f/u OCPs
[X] Call to remind of appointment 9/5, 11:30AM

"Above the line" tasks for patient RR

Difficulty with coordinating meals on wheels: feels like he has to wait around. Speculated that other people deal with these problems too but they have families, daughters, wives, etc. I asked him why he doesn't have a family and he said deflected.

Notes from phone call with patient JR

7/10/14 5:00 PM
Telephone call with patient's daughter
[*telephone number redacted*]

- Suspicious why I would want to follow her father's case. Asked if I was trying to be a surgeon or oncologist and what I would get from following him.
- Explained to her CIC program and that whoever we meet in clinic we follow over the year.
- Will discuss with father and get back to me. Has pager #

7/14/14 7:00 AM
Telephone call with patient's daughter

- Returned call from previous afternoon
- She wanted me to join for appointment w/rad onc & gave me info

Notes from phone calls with patient PC's daughter

He asked me what [the doctor] meant by 'the chemo could keep the cancer under control.' I said that 'control' is not a good word – it could hold off the cancer for a while, but in all likelihood the tumor will grow. He asked why we took his stomach out, how the surgery was like an illness in itself.

Notes after oncologist visit with patient HG

Patient is anxious enough about the biopsy, and feels optimistic enough that the nodule will go away, that he's planning to defer the biopsy. I definitely want to come with him to his ultrasound in December to try and persuade him to get the biopsy… #meaningful because I feel pretty invested in the outcome, and think there's a small chance I can play a helpful role in persuading him to get the nodule checked out. Also, if there was ever a good reason to prescribe an Ativan, this seems to be it.

Notes after endocrinologist appointment with patient JK

7/8/14
Returned call from pt's daughter ... mom would not ... make it to cardiology ... due to being in a very depressed state. ... history of bipolar disorder and currently staying in her room all day, covering her head with sheets, not interacting with others, eating very little, not bathing/grooming daily. ... denies knowledge of any suicidal ideation in the pt. ... will reschedule the cardiology appointment for a later time and will reach out to the pt's PCP for help. I informed the daughter [of option for] psych evaluation by the PES, especially if she considers her mom to be a threat to herself/others. [Pt] needed cardiology clearance to proceed with colon surgery to remove a potentially malignant lesion.

8/11/14
Pt was hospitalized for cardiac clearance and for surgery. Saw her in the hospital today and had a lengthy discussion about the surgery. She is very depressed and ambivalent about going forth with surgery. Spoke with team and will plan a family meeting today to decide on a course of action. I called her daughter to tell her about this. Was present in family meeting with the surgery, medicine, and oncology. Pt agreed to proceed with surgery.

Notes on patient ATV pre-admission and while admitted.

11/10/2014
Telephone call

- We missed you this morning
- We are worried about you and are here to help
- Motivational interview: why?
- How much using?
- When you are ready, here are some options
- If you want to see Dr. tomorrow, he is available 2:30-5:00
- If you want to get detox, you can go to ED
- Give help and hope

- Leg hurts, methadone run out, ran out yesterday
- Yesterday used heroin, since leg was painful
- Using every other day
- Not sure what started, think it might be steroid, cause more craving
- Go somewhere for a few days
- Cant go this afternoon to tisfield to visit friend
- Feel bad about using heroin because weren't using before
- Think it's possible to change

Documentation/planning of phone call with patient EQ

VALUE, MOTIVATION AND IMPACT
Participants valued the system's ability to consolidate their documentation and its ability to help them organize the use of that information. With this system, participants described being able to see everything they valued "all in one spot." One student pointed out that reviewing the medical record was sometimes overwhelming, and that being able to "make my own notes" was "easier for me to follow than to try and go through and read every single note that's like 10 pages long." Some perceived they would be at risk of disorganization without this system, with "half-stuff all over the place" or "scattered notes

everywhere." Even those who documented more minimally would "at the end of the day at least put in the things [they] need to do," and that "really worked." Some participants used the system "all the time" as their "primary tool…otherwise I would forget everything." One noted that there were not alternatives that would similarly support their work: "I have no other way for things not to get lost, for things not to be dispersed in my email, in my little scribbles."

Consolidation and organization led to different experiences for participants. One felt relief: "When I click this due date, it just takes it off my mind…I don't have to be carrying, juggling, what did I have to do next Tuesday? It's just so much for so many people." Another student noted that "it's improved my learning…I have to do things over and over again…and I have to have a consistent method…the way I have all my patients there I've been able to have that continuous story. I think it's done wonders for organizing my learning." One mentioned valuing being able to use a system to organize patient interactions "like when I would…want to do in my calendar and my daily life. It's a way of putting my patients in there too. It integrates them into your life in a way that is organized." Another participant mentioned that the organization enabled them to take stock of all the people whose care they were involved in, to see that "these are my patients." However, in the second focus group some participants found their growing volume of patients and associated Outlook-Tasks as oppressive, with one stating "I start to feel like the task of getting back to being not in the red would be so burdensome that I scare myself away from using it."

Some participants saw potential value in the ability to reflect on the longitudinal body of their work. One participant captured this idea by saying that "this system allows me to tie every experience that I have with that patient together as one linear, longitudinal diary of my experience with that patient." Participants had varying thoughts about how this could be useful. Some anticipated its value in learning, others in developing writing skills, and other hoping to be able to reflect on the year based on these notes. However, some participants implied that collecting such a body of work would not be valuable for them. At the second focus group, several participants introduced the idea that while actively a student this might be less useful for patients whom they followed intensely and think about frequently. The participant above continued to say the system exemplified the mission of LICs by allowing her to "bridge the interdisciplinary component of that patient's care…and that's the whole point of this program, to understand the patient experience and then understand where in the healthcare system there are these disconnects." Another participant anticipated being able to "look back and remember when I did all these things, when I went to the delivery and when I went to the 12 pediatrician visits afterwards." One participant introduced the metaphor of photographs, comparing this system to bringing a camera on vacation: "I like to have something to go back to tell myself that I did do this because I recorded it;" not having it would be "like going to Mexico and not taking an pictures."

Several participants noted the value of the system providing a personal writing space. One student felt the system provided her a safe space to document details that a more advanced clinician would not need to write down. Other students suggested they reflected differently because this space was not visible to others. After describing playing a powerful role in helping a patient understand the options available to her for cancer treatment, the

participant offered thoughts on documenting that in an Outlook-Task: "If I were to write that in any official way, it would seem self serving, 'Aren't you glad I was there?'"

Participants' motivation to use the system changed over time and was influenced by their developing expectations and experience. Initially, they were motivated by their belief that the system would become useful. One participant explained "that's how I'm reassuring myself that I'm not being coerced. I do believe that, because it still feels early, and I have not really called a patient." Another agreed, describing "doing it for someone else, because it's not yet become a useful tool." Another confirmed this expression of worry about being asked to do an administrative task that would have no value to them or to patients. Some identified their place on a developmental progression as influencing their experience: "A lot of the usefulness…is based on stages of experience we're not at yet and can't understand. What if it's the 10th time I'm seeing a patient and you can't remember something about their family?" Some participants were concerned that it was "too early to tell." At the second focus group one participant stated, with the agreement of several others, that "at week 12, I couldn't really foresee how to use it, and it's become more apparent to me as time's gone on."

Participants contrasted this potential value with their identification of a burden of documentation. This burden resulted from a sense of redundancy between EPIC and their Outlook-Tasks with the resulting need for copying and pasting notes between these systems. Participants noted variations in each other's work, with some perceiving the amount of documentation others were doing as beyond what they could manage or tolerate. Several participants described the impact that the burden of documentation had on their use of the system. One mentioned being "more on the tracking things to get done…than pasting everything that happened…that does become a lot of work." Another participant picked up on the vacation photograph metaphor and said "I'm totally the person who would go to Mexico and not take any pictures." This participant explained preferring not to document their experience because "If I can spend ten more minutes with this patient, that's what I want to do. I don't want to spend ten more minutes logging them."

Participants varied in how they understood the role of this system in their grading in the clerkship. Some participants described being motivated to document their experiences in case they some day had to prove their participation in clerkship activities. Some thought they were expected to submit a compilation of only the formal notes they had written about a selected group of patients, and others "thought it was supposed to be a record of when you saw the patient even if it wasn't in your clinic." They saw the system as potentially benefitting them in either scenario. Some of those who thought they were graded on their documentation of informal contact described this as part of their motivation. One participant described this in detail: "Sometimes I'll put in 'I called this patient; I just attended this person's chemotherapy.' If it's not really important for me to show that…I would probably not keep doing that." Other students found that expectation to be inappropriate, and by the second focus group had resigned themselves to tolerate however their manner of work was ultimately assessed. One participant joked that fear was a motivator. Still others worried that they would be graded on the extent or depth of their written reflection on patients: "Am I going to put all this effort in…but then not write my feelings about how meaningful it is, and then nobody will ever know that I was even at the

CIC?" One participant directly implicated concern over grading as having disruptive impact on their reflection: "Concerns about grades or what some people would think of me takes away from the genuine feeling that was coming into it. I'll be like, 'Maybe when they read this they'll think 'What a compassionate student.'' That destroys the moment for me, so I don't do it anymore."

The value and impact of reflective writing varied across participants. Some describe encouraging themselves to do so early on, but that it was "kind of weird…I wrote a sentence like 'It felt really great to be able to be there for her to answer that.' But that is for myself." In the description accompanying an Outlook-Task, another participant corroborated this idea of the documentation having personal value: "I use this to make notes about appointments I attend with patient, whom I follow closely. I don't write notes for him, so this is just for me." Other participants felt that documenting their felt experience was unnecessary: "If my patient that I go see every day had a paracentesis, I remember the experience about being next to him while that happened. I don't ever feel the need to say "I was standing next to him." Some even felt reflecting could have a negative impact: "When I'm typing in the notes it almost takes away from the beauty of reflecting for me, in that it feels like I'm doing it for someone else to see how I'm feeling, or how I'm interpreting something." Participants suggested that their need to engage in reflective writing changed over time: later in the year they had less need for a private space to document, attributing this to having "adapted a little more to the emotional environment." Finally, some participants identified limitations to reflective writing, stating that "the things I personally find meaningful aren't usually documentable things."

Participants identified potential uses for this system in other educational settings. One suggested that hospitals developing longitudinal patient following could provide this system to their students, pointing out that the system would be particularly helpful "because they're seeing them more sporadically." Another participant suggested it would be helpful even in a traditional clerkship setting.

DISCUSSION

Discussion, Limitations, Conclusions, and Suggestions for Future Work

This study offers a detailed description of a cohort of LIC students' experience piloting a new system for consolidating their documentation of patient contact and for organizing their clinical follow up.

We aimed to assess the feasibility, utility, and acceptability of the system, as well as to explore the system's role in integrating and reflecting on any aspect of students' experience in an LIC. We were able to successfully teach the system with only three hours of formal training; no participant reported persistent confusion or overwhelming technical difficulty documenting or using the system to plan, which supports its feasibility. Additionally, the system required no additional financial resources from either the clerkship or the hospital system housing it.

Participants found the system useful, expressing a range of positive appraisals of its ability to support the logistics of patient following, clinical learning, and general participation in the clerkship. The system was flexible, as shown by it serving a variety of uses including those beyond what we originally intended. Some participants described their Outlook-Tasks helping them consolidate their thinking about patients and reflect on it retrospectively, demonstrating that the system supported reflection on and integration of their experience following patients over time and across venue. This study may have identified an important gap in the resources that LICs provide to their students to follow patients, as well as identifying organizational features unavailable to clinicians in current EMRs. However, it could certainly not replace the existing logbook system as it lacks important functionality such as providing students pager/email notifications of patient visits and allowing the medical school to track students' exposure to a wide range of core diagnoses.

The utility of the system was intertwined with its acceptability. Some students found the act of documentation burdensome, and were concerned by the unclear relationship between their informal documentation, their reflective writing, and their grade. Encouragement to engage in reflection about patient care had mixed impact on students, and likely influenced the acceptability of the system generally. Continued use of the system by nine of the 12 students support that students found it useful and acceptable by their own assessment.

Our study was successful in sampling real-time, unstructured documentation of participants' contact with patients. We were unable to collect such data from all participants, but have some evidence as to the reasoning for some students not producing such documentation.

The integration of a logbook with a task management system is novel, and there is little existing research to guide our interpretation of this qualitative data. Even introduction of a task management system in a clerkship is novel, and no research exists either on that feature independently or as part of a system to document student activity. Our findings of varied student usage are consistent with previous studies of traditional logbooks. They add more nuance to the reasoning behind this variation by exploring themes of utility and value to students. They also begin to describe the challenges of collecting reflective writing from students as part of their logbooks. The continued use of the optional system by at least nine of twelve participants is high. Our study design does not enable to us to suggest why, but we hope future research will more thoroughly explore the benefits of designing logbooks with students and patients in mind.

Logbook researchers have recommended that logbooks are ideally used in regular meetings with students. One might imagine students' Outlook-Tasks as the basis for regular faculty student conferences about the patients they are following. This study identifies areas that may lead to potential conflict stemming from the inclusion of students' reflective writing in their grading. Educators may indeed desire to develop and evaluate their students' reflective writing skills, and could use the results of this study to plan possible interventions to educate students about the reasoning for these curricular elements. This might include formal acknowledgement that as part of an LIC students are graded on both

the depth of their engagement with patients and their ability to communicate that engagement in writing.

Logbook data may be best considered as surrogate measures. As with other surrogate measures in medicine, reports on students clinical activity may distract us from evaluating the outcomes we desire. LICs are not designed to make students accurate or exhaustive loggers, but patient-centered physicians. Technological resources should be used to support the experiences that create these outcomes, not simply to create data.

STRENGTHS AND LIMITATIONS

This study's use of focus groups offers a detailed perspective from student users of a log to describe the complex nature of acceptability. We did not predefine parameters for feasibility, acceptability, and utility. Given the limited existing scholarship in this area, we were not aware of existing tools to study these questions in this setting. Introduction of a structured tool for assessing these parameters may have limited the breadth of student discussion demonstrated in the focus groups; we thus feel this level of structure was appropriate for our preliminary evaluation. Our lack of a control group limits our consideration of the impact of using this system on longitudinal following, but enabled a broader range of perspectives because all CIC participants were exposed to the pilot system.

We cannot fully determine the impact of the study environment on students' writing. Some wrote evocative descriptions of their experiences. Others may have been dissuaded from writing things because of concerns about grading or because they felt uncomfortable with the impact of their emotional experience being on display. Several participants confirmed that their experience is frequently more complex and dynamic than they could effectively document. For those who did try to capture their experience, our expectation of reflection may have affected the nature of that documentation, possibly encouraging them to wax poetic or characterize their interactions with patients more dramatically. This mix of impacts is consistent with experiences of students using portfolios to track their educational experiences.

This study focuses on participants' assessment of the value of the system, and does not explore the value such a system may have to educators or to patients. One could imagine educators valuing this tool as a way to review a students' involvement with their panel of patients, specialists valuing students' ability to provide a detailed clinical summary, or patients valuing a student having consolidated clinical data to help unknown providers better understand their experience of illness.

CONCLUSIONS

The results of this study offer no clear guidance for educators in LICs. This study instead identifies a potential lack of logistical tools supporting LIC students in their complex task of following patients, and offers an inexpensive and teachable system that may be able to provide some of that support. While participants spoke highly of the numerous valuable uses of this system, they described powerful negative impacts on their experience related to observation of reflection and burden of expected documentation. This system should continue being explored as an additional resource for students. Educators should pay

careful attention to communication with students about the relationship between their use of it and students' grades. It may be tempting to implement this system with the goal of eliciting expressive writing from every student. Further analysis of this study with more systematic qualitative methods, longer term follow up, as well as repetition of this study with other students at other sites would better assess the benefits and harms of doing so.

SUGGESTIONS FOR FUTURE WORK

Our results suggest a need for additional organizational and task-management systems for LICs and as part of EMRs. These systems could become part of LIC logbooks, but further research should explore the value of such systems piloted outside the context of logbooks, reflection, and grading. Such systems should additionally be explored with clinician users.

Our qualitative data about utility and acceptability could support the development of tools for assessing logbooks. Such tools would enable evaluation of logbook technologies like this one that are designed to serve students and patients in addition to educators. Such tools might lead to right-sizing of the role of logbooks in medical education.

In addition to helping meet the aims of this project, we believe that having an easily accessible, HIPAA protected method for formally and informally documenting patient contact will be useful in exploring the nature of longitudinal relationships with patients in LICs and their role in learning. Not all students documented their experiences or reflections in a way that is amenable to qualitative analysis. Those that did created their writing in real time and at times wrote extensively; that writing may meet the call for detailed, prospective documentation of students' interactions with patients. This study also offers extensive insight into the technological context as well as participants' perceptual context in regard to clerkship requirements, privacy, and personal growth, which can aid in the interpretation of this documentation. We remain hopeful that these notes offer a more detailed window into the understand the nature of students participation in longitudinal patient care, beyond what current logbooks have offered so far. This may provide an opportunity to better understand the active ingredient of students' unique learning experiences in LICs.

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